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# HEALTH CARE STUDIES AND CLINICAL INVESTIGATION ACTIVITY

FURTHER EXAMINATION OF THE UNIT COHESION INDEX

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The questionnaire "Unit Cohesion Index" turned out to be psychometrically sound. →

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FURTHER EXAMINATION OF THE UNIT COHESION INDEX  
Herbert Jacobs, Dipl.-Psych.

SUMMARY

In the present study, the psychometric properties of the Unit Cohesion Index, developed by Mangelsdorff et al. (1989) from the Platoon Cohesion Index (Siebold and Kelly, 1988), were further examined.

Because of the highly homogeneous sample consisting of hospital personal and an over representation of officers, the factor solution of the previous study and its derived scales were accepted for the further analysis. The reliability estimates were considerably high in spite of that. The test-retest-reliability was very high as well.

The perceived unit cohesion was in the moderately high range. This finding is of interest to commanders.

Group comparisons showed that enlisted perceived a higher unit cohesion than officers. The other independent variables had no effect by themselves, but in combination with the rank group. Officers with 4 to 10 years in military service perceived less unit cohesion, especially when they themselves were new members in their units. The study points to this group of personnel to be focused on when concerned with unit cohesion in reserve hospitals. From a psychometric point of view the group comparisons showed that the questionnaire was not confounded with measuring or reflecting the independent variables.

The questionnaire "Unit Cohesion Index" turned out to be psychometrically sound.

INTRODUCTION

Purpose:

The purpose of this study is to continue the psychometric examination of the Unit Cohesion Index, a questionnaire to measure the level of unit cohesion in Army Reserve Units. The questionnaire can be used as an instrument of researchers as well as military leaders to gain information about the cohesion of their units as an important feature of their readiness.

Background:

Siebold (1987, 1988) conceptualized and defined military unit cohesiveness, elaborated on how small unit cohesion affects performance and developed the Platoon Cohesion Index (Siebold and Kelly, 1988).

Mangelsdorff et al. (1989) gave an overview of international research over history dealing with unit cohesion and the relation of this concept to combat readiness. He also modified the Platoon Cohesion Index (Siebold and Kelly, 1988) for Army Reserve units and examined the psychometric properties of this Unit Cohesion Index. Three scales with high reliabilities were derived from a factor analysis and named "Leaders", "New Members" and "Unit Cohesion". The scores for all units examined showed moderately high degrees of unit cohesion. A retest of selected units showed a variation of the scores depending on events during training.

## OBJECTIVES

In this study, the psychometric examination of the questionnaire was continued with data from a new sample. Especially, we used repeated measures to determine the test-retest-reliability of the instrument.

## METHOD

### Questions

To further examine the psychometric properties of the questionnaire, the following questions were asked in this study:

Are the scales of the questionnaire replicable in this small and homogeneous sample?

How reliable are these scales?

Is the test-retest-reliability of the questionnaire satisfactory?

How high is the assessed unit cohesion in this sample?

Are there group differences concerning the assessment of cohesion between higher and lower ranks, new and old members of a unit, and soldiers with shorter and longer times in military service?

Are the results of this questionnaire confounded with other variables like rank, number of months with the unit, and number of years in military service?

### Subjects

Soldiers from the 311th Station Hospital, Sharonville, Ohio, were tested during a weekend drill period in June 1990. The test was repeated after 24 hours. The soldiers gave digits of their social security number on their questionnaires so that matching of the two questionnaires to a person was possible.

### Procedure

The Unit Cohesion Index consists of 20 items using 5-point Likert scales which were modified from the Platoon Cohesion Index (Siebold and Kelly, 1988). All items range from +2 to -2. For 17 of the items, the format reads: "Strongly Agree" (+2) to "Strongly Disagree" (-2), 2 questions have the format: "Very Satisfied" (+2) to "Very Dissatisfied" (-2), 1 question: "Very Well" (+2) to "Very Poorly" (-2).

Two officers read the instructions and handed out and collected the questionnaires.

Analyses of the Unit Cohesion Index results included factor analysis of the 20 items, reliability determinations of the whole questionnaire and of the subscales that were derived from the factor analysis and from the factor solution of the study of Mangelsdorff et al. (1989), the determination of the test-retest-reliability, and analysis of variance comparisons using the number of months in the unit, the years of military service, and rank as the independent variables.

## RESULTS AND DISCUSSION

### Demographics

Complete data sets of the 20 items in the first and second administration were obtained from 109 soldiers. The individuals belonged to more than 16 different platoons and specialties. The sample is not representative for Army

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reserve units in general as it was only taken from a hospital and is more homogenous than a random sample of all possible Army reserve units. The homogeneity is reflected in the results. Additionally the rank group of the officers was over represented in this sample.

Table 1 shows the distribution of ranks in the sample. The distribution shows that the sample is not representative for army reserve units in general and probably not for reserve hospitals, although a higher percentage of officers than in other units can be expected in hospitals.

Table 2 shows the distribution of the numbers of months the soldiers had been with the unit, which were wrapped up to two groups.

Table 3 shows the distribution of the numbers of years in military service, which were wrapped up to three groups.

Table 1  
Distribution Of Ranks

	Frequency	Percent
E1 - E4:	30	27.5
E5 - E9:	29	26.6
W01 - W04:	1	.9
O1 - O3:	32	29.4
O4 - O6:	12	11.0
Missing:	5	4.6

Table 2  
Distribution of "Months in Unit"

Months	Percent
0 - 24	50.5
25 - 99	49.5

Table 3  
Distribution of "Years in Military Service"

Years	Percent
0 - 3	38.6
4 - 10	32.7
11 - 30	28.7

### Factor Analysis

The responses to the 20 cohesion items from 109 soldiers with complete data sets on these items in both administrations were submitted to a principal components factor analysis for each administration separately.

Both factor analyses gave factor solutions with four factors with eigenvalues greater than 1.0, accounting for 65.8% and 69.7% respectively of the cumulative variance. A Varimax rotation with Kaiser normalization was performed on the factors. The two factor solutions for the data of the first and the second administration were very similar, but not identical. As the data of the second administration were not independent measures, but repeated measures of the same individuals, the result of this second factor analysis was not considered in the further data analysis.

From the factor solution of the first administration, items having an item-factor score of .40 and greater were extracted. Four item clusters with at least four items in each were obtained.

### Reliability Estimates

The four item clusters and the Unit Cohesion Index, all the 20 items of the whole questionnaire, were subjected to reliability estimates using the Kuder Richardson procedure to calculate coefficient alpha. The coefficient alphas are shown in Table 4.

The contents of the scales were not as consistent as in the previous study so that we did not label them.

The sample of this study is obviously not representative for Army reserve units and is relatively small for a factor analysis. That the reliability coefficients are higher than in the previous study, although the contents are less consistent, is probably related to a higher homogeneity of the sample. The new factor solution and the new derived scales probably depend on the special sample, while the factor solution and the derived scales of the previous study were based on a much larger, more varied and thus more representative sample. Therefore we submitted the new data to the calculation of coefficient alpha for the scales of the previous study following the factor solution of that study. The coefficient alphas for the separate scales are also shown in Table 4. Following the high consistency of the scales, they had already been named in the previous study as "Leaders", "New Members" and "Unit Cohesion".

Additionally the same procedure was calculated for the data of the second administration with the same scales of this and the previous study. The coefficient alphas are also shown in Table 4.

Table 4 gives an overview of the reliability coefficients.



Table 4

Reliability estimates (coefficient alpha)

1st administration

Four new scales	Scale 1	10 items	.922
	Scale 2	8 items	.870
	Scale 3	4 items	.810
	Scale 4	4 items	.753
Three previous scales	Scale 1	8 items	.907
	Scale 2	6 items	.831
	Scale 3	5 items	.801
Unit Cohesion Index		20 items	.933

2nd administration

Four new scales	Scale 1	10 items	.933
	Scale 2	8 items	.891
	Scale 3	4 items	.854
	Scale 4	4 items	.777
Three previous scales	Scale 1	8 items	.929
	Scale 2	6 items	.861
	Scale 3	5 items	.863
Unit Cohesion Index		20 items	.948

As the reliability coefficients are all considerably high, even for the scales of the previous study, we stayed with the scales of the previous study by the reasons mentioned above.

Pearson Correlation Coefficients were determined for the three scales of the old factor solution and the Unit Cohesion Index on the complete data sets of the 20 Items of 109 people from the first and second administration. Table 5 shows the results.

Table 5

Pearson Correlation Coefficients

Scale 1, "Leaders":	$r = .925$	$(p < .001)$
Scale 2, "New Members":	$r = .859$	$(p < .001)$
Scale 3, "Unit Cohesion":	$r = .796$	$(p < .001)$
Unit Cohesion Index:	$r = .934$	$(p < .001)$

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Level of Unit Cohesion

The mean scores of the questionnaire and the subscales that were derived from the factor solution of the former study ranged between .578 and .842 with a possible minimum of -2 and maximum of +2. The means indicated a perceived unit cohesion in the moderately positive range. Table 6 shows the findings.

Table 6

Mean scores on Unit Cohesion Index and its scales

Scale	Content	Admin.	Number of Items	Mean Score	Standard Deviation
UCI	Unit Cohesion Index	1st	20	.690	.585
UCI	Unit Cohesion Index	2nd	20	.621	.587
1	Leaders	1st	8	.689	.719
1	Leaders	2nd	8	.598	.721
2	New Members	1st	6	.604	.625
2	New Members	2nd	6	.578	.642
3	Unit Cohesion	1st	5	.842	.551
3	Unit Cohesion	2nd	5	.813	.527

Note: The possible range of the scores is from +2 to -2. High scores mean high cohesion and are thus positive.

Analysis of Variance Comparisons

One way analysis of variance comparisons were made on the three scales "New Members", "Leaders" and "Unit Cohesion" and the Unit Cohesion Index (all 20 items) with the months in the unit, the years in military service and the grade as independent variables. The data of the first administration were used, the data of the second administration were not further analyzed as they were not independent measurements.

Months in Unit: New versus old members of the unit were compared. The group of new members was defined as having been with the unit up to 24 months, according to the explanation included in the questionnaire. The group consisted of 52 people vs. 51 people in the other group. There were no significant differences in any of the comparisons.

Years in Service: Three groups with up to 3 years (N = 39), 4 to 10 years (N = 33), and 11 to 30 years (N = 29) of military service were compared. There were no significant differences in any of the comparisons. A significant effect occurred, when a multiple way analysis of variance was used. The higher number of missing cases (N = 93) lead to a significant effect of the number of years in military service on the scale "New Members" in the direction that the group of people with a middle range of 4 to 10 years of service assessed the cohesion

concerning new members lower than the two groups with less and with more years of service. This effect is obviously depending on features of the sample and thus should not be interpreted.

Rank: Two rank groups of the enlisted (N = 59) versus officers (N = 44) were compared. The enlisted assessed a significantly higher cohesion on the scale "New Members" ( $p = .0391$ ) and on the Unit Cohesion Index ( $p = .0495$ ). The rank group variable accounted for 4% of the variance of the scale "New Members" and of the Unit Cohesion Index. Table 7 shows additional figures.

Table 7

Rank groups by:

Scale "New Members":  $F = 4.37$  ( $df = 1/102$ ),  $p = .039$ ; (multiple  $r = .204$ )

Unit Cohesion Index:  $F = 3.95$  ( $df = 1/102$ ),  $p = .050$ ; (multiple  $r = .194$ )

The three way analysis of variance showed a significant interaction effect for the rank group and the number of years in military service in the Unit Cohesion Index. The result showed that the officers with 4 to 10 years of service assessed unit cohesion in general significantly less than all other groups. This gives some more explanation for the effect of the years of service by themselves depending on the sample. The three independent variables accounted for 8% of the variance of the result on the "Unit Cohesion Index". On the scale "Unit Cohesion", there was a significant combined effect of all three independent variables in the way that the same group as before, the officers with 4 to 10 years of service, assessed the unit cohesion in their unit to be significantly lower, when they were new members of their unit (up to 2 years), than assessed by the other groups. The independent variables explained 2% of the variance. This result could be explained by the situation of the officer personnel in a hospital, who have especially in their middle ages high professional qualifications also for a civilian career, but often not the same financial compensation. Younger officers are still gaining this qualification so that their situation is more similar to their comparable civilian colleagues, older officers look forward to retirement so that they might not compare themselves with civilian colleagues any more or expect an upcoming civilian career. These factors of personal satisfaction may also affect the assessment of cohesion in the unit.

### CONCLUSION

The results of the study answer the questions as follows:

The reliability of the scales of the previous study was very high with the data of the new study so that they can be applied on the data of this sample, although the reliability of the scales derived from the factor analysis of these data was even higher.

The test-retest-reliability was very high and by that very satisfactory.

The unit cohesion assessed by the soldiers in our sample was in the moderate high and positive range.

We found group differences in the assessment of unit cohesion between enlisted and officers the later perceiving a lower unit cohesion. Officers with 4

to 10 years in military service especially perceived less unit cohesion. When they themselves were new members in their unit, they perceived less cohesion on the scale "Unit Cohesion".

The group comparisons also show that the results of the questionnaire were not confounded with measuring the independent variables of rank, number of months in the unit, and number of years in military service.

#### RECOMMENDATIONS

The results of this study point to the group of officers with 4 to 10 years in military service, especially when they are in a new assignment, as the personnel group to focus on, when concerned with unit cohesion in reserve hospitals.

To further examine the questionnaire, the test-retest-reliability should be tested with a larger and more heterogeneous sample. There could also be more time between the first and the second applications. Further information about the validity of the instrument needs to be gained.

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